

What is claimed is:

1. An electrical current generation system comprising:
a high temperature fuel cell having an anode inlet and an anode exhaust outlet; and
5 a rotary adsorption module fluidly connected to the anode exhaust outlet and the anode inlet, and operable to receive exhaust gas from the anode exhaust outlet, to separate and enrich usable fuel gas from the exhaust gas by displacement purge adsorptive means, and to deliver at least a portion of such enriched usable fuel gas for export from the generation system as fuel for external use in a downstream system.
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2. The electrical current generation system according to claim 1, additionally comprising:
a second gas separation system fluidly connected to the rotary adsorption module
operable to further purify the usable fuel gas component in the exported portion of the enriched fuel gas, for external use in a downstream system.
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3. The electrical current generation system according to claim 1 wherein the high temperature fuel cell is a solid oxide fuel cell.
4. The electrical current generation system according to claim 1 wherein the high
20 temperature fuel cell is a molten carbonate fuel cell.

5. The electrical current generation system according to claim 1 wherein the rotary adsorption module is additionally operable to deliver at least a portion of the enriched usable fuel gas to the anode inlet.

5 6. The electrical current generation system according to claim 2 wherein the second gas separation system is a pressure swing adsorption system.

7. The electrical current generation system according to claim 6 wherein downstream system comprises a high pressure hydrogen storage system operable to store purified hydrogen
10 fuel for dispensing to hydrogen vehicles.

8. An electrical current generation system comprising:
a molten carbonate fuel cell comprising an anode inlet and an anode exhaust outlet;
a rotary adsorption module, containing adsorbent material, fluidly connected to the
15 anode exhaust outlet and the anode inlet, and operable to receive exhaust gas from anode exhaust outlet, to separate and enrich usable fuel gas from the exhaust gas by displacement purge adsorptive means to leave a fuel depleted waste gas stream, and to deliver at least a portion of such enriched usable fuel gas to the anode inlet; and
a heat exchange means operable to increase the temperature of a displacement purge
20 gas, and to deliver such heated displacement purge gas to the displacement purge rotary adsorption module to assist desorption of the fuel depleted waste gas stream from the adsorbent material.

9. The electrical current generation system according to claim 8, wherein the molten carbonate fuel cell further comprises a cathode inlet, and the rotary adsorption module is further operable to deliver at least a portion of the fuel depleted waste gas to the cathode inlet.

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10. The electrical current generation system according to claim 8 wherein the rotary adsorption module is further operable to deliver at least a portion of the enriched usable fuel gas for export from the generation system as fuel for external use in a downstream system.

10 11. The electrical current generation system according to claim 8 additionally comprising a second heat exchange means operable to receive anode exhaust gas from the anode exhaust gas outlet, to reduce the temperature of the anode exhaust gas and to provide the cooled anode exhaust gas to the rotary adsorption module to enhance the adsorption of the fuel depleted waste gas from the anode exhaust gas.

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12. A process for generating electrical current comprising:
providing a high temperature fuel cell having an anode inlet and an anode exhaust outlet, and a rotary adsorption module;

providing anode exhaust gas from the anode exhaust outlet as a feed gas mixture to the
20 rotary adsorption module;
separating and enriching usable fuel gas from the anode exhaust gas by adsorptive means in the rotary adsorption module;

providing at least a portion of such enriched usable fuel gas for export from the generation system for use as fuel for external use in a downstream system.

13. The process according to claim 12 additionally comprising providing at least a portion
5 of the enriched usable fuel gas for recycle to the anode inlet.

14. The process according to claim 12 wherein the high temperature fuel cell is a solid oxide fuel cell.

10 15. The process according to claim 12 wherein the high temperature fuel cell is a molten carbonate fuel cell.